

Fat (Crude) or Ether Extract in Animal Feed: Direct Method

Scope

This method is suitable for the determination of fat from mixed feeds.

Summary

The sample is vacuum dried and then reflux extracted with ether. The weight of the fat extracted is used to calculate the percentage of fat in the sample.

Comments

This method is not suitable for feeds that are baked and/or expanded (see Fat (Crude) or Ether Extract in some Pet Foods) or for dried milk products (see Fat (Crude) or Ether Extract in Dried Milk Products). Large amounts of water soluble components such as carbohydrates, urea, lactic acid, glycerol and others may interfere with extraction of fat; if present, extract a two gram sample on a small paper in funnel with five 20 ml portions of deionized water prior to drying for ether extraction.

Apparatus and Materials

- A. Extraction thimble.
- B. Extraction cups.
- C. Desiccator.
- D. Vacuum oven, 95-100°C.
- E. Oven, 100°C.
- F. Fat extraction apparatus.

Reagents

- A. Anhydrous ethyl ether.

Procedure

- A. Weigh approximately 2.0 g of ground feed (to the nearest 0.0001 g) and transfer to an extraction thimble.
- B. Place the thimble and sample in a vacuum oven and dry at 95-100° under a pressure of less than 100 mm Hg for about 5 hours (for the official procedure). Dry in a regular oven at 100° for one hour for the screening procedure.
- C. Dry an extraction cup for 30 minutes at 100°, cool in a desiccator and weigh to the nearest 0.0001 g.
- D. Turn on the power switch on the service unit of the extraction system and allow it to warm up to proper temperature (100°) (20 - 30 minutes). Turn on the water to the extraction unit condenser.
- E. After the thimbles and samples have dried for 5 hours, remove them from the vacuum oven and place in a thimble support holder.
- F. Place the dried and weighed extraction cups in the cup holder.
- G. Place the sample extraction mode knobs on the extraction unit in the "rinsing" position.
- H. Insert the thimbles into the condensers by raising the holder into the condensers.
- I. Move the extraction mode knob to the "boiling" position to pick up the thimbles and then move extraction mode knobs to "rinsing" position.
- J. Remove the thimble support holder and center the thimbles if necessary.
- K. Dispense 50 ml of dry ether into the sample cups and place the cups in a cup holder. Position the cups in holder on the hot plate.
- L. Lower the handle on the left side of the unit ensuring that the safety catch engages.
- M. Extract the samples by one of the following protocols.

1. Screening Procedure.
 - a. Move the extraction mode knobs to the "boiling" position and extract samples in boiling ether for 30 minutes. Make sure the condenser valves are open.
 - b. Move the extraction mode knobs to the "rinsing" position and allow to rinse for 1 hour.
2. Official procedure.
 - a. Move the extraction mode knobs to the "rinsing" position and allow to extract for 16 hours (overnight). Make sure the condenser valves are open.
- N. After extraction (and rinsing), close the condenser valves by turning a quarter turn.
- O. When almost all of the solvent is collected in the condenser, press the AIR button on the service unit and open the EVAPORATION valve on the extraction unit.
- P. After the last traces of solvent are collected in the condenser, close the EVAPORATION valve.
- Q. Release the extraction cups by raising the handle and remove the cups with the cup holder.
- R. Place the thimble support holder in position on the hot plate and lower the handle.
- S. Move the extraction mode knobs to let the thimbles slide into the thimble supports.
- T. Release the handle and follow the upward movement with the support holder. Bend the holder and remove the thimbles.
- U. If another extraction is to be performed immediately, insert a new batch of thimbles and cups.
- V. Fill the solvent reservoirs on condensers to the top mark with dry ether using a syringe through the holes on top of the unit.

- W. Open the condenser valves before beginning the next extraction.
- X. Dry the cups and fat at 100° for about 30 minutes, cool in a desiccator and weigh to the nearest 0.0001 g.

Calculations

- A. Subtract the weight of the cup from the weight of the cup plus fat to get the weight of the fat.
- B. Divide the weight of the fat by the sample weight and multiply by 100 to get the percent of fat or ether extract.

Quality Control

- A. Monitor the extraction and rinse times.
- B. Check the temperature of the drying oven before use with a calibrated thermometer and document.
- C. Monitor the length of time the flasks and fat are dried. Should be 30 minutes at 100°C.

Bibliography

Official Methods of Analysis (1984) 14th Ed., AOAC, Washington, D.C., sec. 7.062